

TAXONOMIC REVIEW OF HODGSON'S GIANT FLYING
SQUIRREL, *PETAURISTA MAGNIFICUS* (HODGSON)
[SCIURIDAE : RODENTIA], WITH DESCRIPTION
OF A NEW SUBSPECIES FROM DARJEELING DISTRICT,
WEST BENGAL, INDIA¹

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(With three text-figures)

INTRODUCTION

The taxonomic status of the giant flying squirrels with prominent yellow shoulder patch, *Sciuropterus magnificus* Hodgson, 1836, and *Sciuropterus nobilis* Gray, 1842, have been the subject of some controversy since the publication of the 'Catalogue of the Mammalia in the Museum of the Asiatic Society of Bengal' by Blyth (1863), who treated them as conspecific. Subsequently, Jerdon (1874), Anderson (1878), Sclater (1891), Blanford (1891), Robinson and Kloss (1918), Ellerman (1940, 1947, 1949 and 1963), Ellerman and Morrison-Scott (1951, 1966) and Chakraborty (1975), followed Blyth (1863). Wroughton (1911, 1919), however, accepted *S. nobilis* Gray as a distinct species, but treated *S. magnificus* Hodgson as a subspecies of *Petaurista albigenter* (Gray).

During the last few years fresh material of giant flying squirrels has been collected by the Zoological Survey of India parties from Darjeeling District, West Bengal, and Bhutan, both in winter and summer seasons. These specimens offered an opportunity to us to study the subject afresh and evaluate the taxonomic status of the two flying squirrels. The result of this study has been presented in this paper.

Opportunity has also been taken to describe a hitherto unknown subspecies of *Petaurista magnificus* (Hodgson).

All measurements have been expressed in millimetres. The colour names given with initial capital letters in the text have been recognized according to Ridgway's (1912) nomenclature.

RESUMÉ OF THE TAXONOMY OF *Sciuropterus magnificus* HODGSON, 1836, *Sciuropterus nobilis* GRAY, 1842 AND *Sciuropterus chrysothrix* HODGSON, 1844

The giant flying squirrels, originally described as *Sciuropterus magnificus* Hodgson, 1836, *Sciuropterus nobilis* Gray, 1842, and *Sciuropterus chrysothrix* Hodgson, 1844, were studied by Blyth (1847) and Horsfield (1851). They however, used the generic name *Pteromys*, and retained *Pteromys magnificus* (Hodgson) and *Pteromys nobilis* (Gray) as distinct species, with *Sciuropterus chrysothrix* Hodgson as a synonym of *P. nobilis*. Although the paper of Hodgson (1844) giving accurate accounts of the new species, *Sciuropterus chrysothrix* and *S. senex*, was sent to the Editors of the Journal of the Asiatic Society of Bengal much earlier in 1842 (long before Gray's), due to delay in printing (of the colour plate), it came out as late as 1844 with the following note by Blyth: 'The truth

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is, both of them are species *already* described ; viz. the *Pteromys nobilis* and *P. caniceps* of Gray, and it would not be creditable to the Journal that they should be published under Mr. Hodgson's new names'. Despite that note, Blyth (1863) in his subsequent publication himself synonymized *Sciuropterus nobilis* Gray and *Sciuropterus chrysothrix* Hodgson with *Pteromys magnificus* (Hodgson), with their status designated as 'variety' in his catalogue. Jerdon (1874), Anderson (1878), Sclater (1891) and Blanford (1891) also treated them in a similar manner. The last-named author, however, emphasized on the presence or absence of the middorsal strips, and thought that *S. nobilis* was the summer garb and *P. magnificus*, the winter garb of *Pteromys magnificus* (Hodgson).

It was Wroughton (1911) who used Link's generic name *Petaurista* for the giant flying squirrels, and correctly emphasizing on the presence of a distinct saddle unlike in any of the giant flying squirrels, considered *Petaurista nobilis* (Gray) as a distinct species. He, however, left *Sciuropterus magnificus* Hodgson under *Petaurista albiventer* (Gray) as a subspecies.

Robinson and Kloss (1918), emphasizing on the dorsal stripe, reverted to Blyth's (1863) taxonomy of the group. They had with them 'nobilis' form with and without any dorsal stripe, thus nullifying its importance as the diagnostic character of *S. chrysothrix* [= *Petaurista nobilis* (Gray)] as stated by Hodgson (1844). They also attributed the prior name *P. magnificus* (Hodgson), to the two available forms. Ellerman (1947) and Ellerman and Morrison-Scott (1951, 1966) followed Robinson and Kloss's taxonomic treatment. Although, Ellerman (1963) admitted that 'nobilis' is strikingly distinct from all other *Petaurista*, and 'magnificus' is not so striking, but with the scanty material (available to him), he concluded that the two forms were seasonal variants, despite the fact that he had

both summer and winter collections of both of them. Based on a study of the additional material recently obtained from Bhutan in summer and winter, Chakraborty (1975) concluded that *P. magnificus* is a distinct species with a constant pelage colour, and that *P. nobilis* and *P. chrysothrix* are nothing but its synonyms. *Petaurista magnificus* differs from all other species of the genus by having a constant dark maroon saddle on the back even in the sub-adult stage, which may sometimes be partly or fully divided down the spine by a yellowish buff line.

The following points may be summarized from the extant literature :—

Since the publication of Blyth's (1863) 'Catalogue', except Wroughton (1911, 1919), all other authors attributed undue importance to the middorsal stripe. They overlooked the basic colour pattern and also the original descriptions. Additional material of *P. nobilis* with or without the stripe, perhaps, put them in a dilemma. Blanford (1891) and his followers considered the two species as seasonal dimorphs. But Robinson and Kloss (1918), Ellerman (1947, 1963) and Chakraborty (1975), who had various forms of *P. nobilis* from different seasons, with or without the middorsal stripe, curiously overlooked the fact that seasonal change cannot be attributed to the two forms, and they maintained the traditional concepts about the two species. And this was perhaps due to a mislabelled specimen (skin and skull) of *P. nobilis* designated (by Robinson and Kloss 1918) as a paratype of *S. magnificus* now in the collection of the Zoological Survey of India (Reg. No. 9728).

Robinson and Kloss (1918) said that the 'Co-types' of *Petaurista magnificus* were in the British Museum and the Indian Museum. But in Sclater's (1891) catalogue of the collection in the Indian Museum, the skin marked 'a' did not have any skull. This specimen

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has been registered as ZSI. Reg. No. 9728 : skin and skull, after the collection of the Indian Museum was received by the Zoological Survey of India in 1916.

On examination of the alleged 'Co-type'—skin and skull, furnished with an additional label by Robinson himself and written in red ink 'probably a paratype of the species' (= *P. magnificus*), we found that the skull was typical of *P. albiventer* and certainly did not belong to the skin, and that the skin was that of *P. nobilis* with a distinct maroon saddle and the middorsal stripe broken at places. Moreover, Hodgson's specimen with the middorsal stripe, that was presented to the India Museum, London, was taken from Darjeeling, which cannot be the type-specimen of *S. magnificus*, whose type-locality is Nepal. This particular specimen belongs to the material of Hodgson's *S. chrysothrix* from Darjeeling, and on the basis of which Gray's *S. nobilis* was established. Wroughton's (1911, 1919) assertion that *S. magnificus* was a subspecies of *P. albiventer* (Gray) was due to his reliance on the basic colour pattern, namely, grizzled upper surface. But he failed to appreciate the distinct shoulder patch as an important character which isolates *P. magnificus* and *P. nobilis* from the rest of the species under the genus.

A reference to the original descriptions of the three species, namely, *S. magnificus*, *S. nobilis* and *S. chrysothrix* will show that the description were amply clear about their distinct colour-patterns (see also Text-fig. 1).

TAXONOMIC ACCOUNT

Order Rodentia

Family SCIURIDAE

Subfamily PETAURISTINAE

Petaurista nobilis (Gray)

Sciuropterus nobilis Gray, 1842, *Ann. Mag. nat. Hist.*, 10 : 263. Darjeeling.

Sciuropterus chrysothrix Hodgson, 1844, *J. Asiat. Soc. Beng.*, 13 : 67. Nepal.

For diagnosis see key (p. 101).

Petaurista nobilis nobilis (Gray)

Material examined : West Bengal ; Darjeeling District : 7♂, 4♀ ; Ghoombhanjang (alt. c 2117 m), 15-16 June 1974, 25-26 Feb. 1975 and 27-29 Mar. 1975 ; 2♂, 2♀ : Selimbong (alt. c 2250 m), 20-24 Mar. 1975, coll. R. K. Ghose. 1 unsexed : no other data, don. W. Rutledge, 1♀ : no other data, don. Zoological Garden, Alipore. 2 unsexed (1 juv.) : no other data, don. L. Mandelli.

Diagnosis : Fully agrees with the clear description of Hodgson's *Sciuropterus chrysothrix* (Text-fig. 1A).

External measurements : 9♂ : Head and body, 347-420 ; tail, 378-490 ; hind foot, 70.5-77.5 ; ear, 40-45. 6♀ : Head and body, 368-410 ; tail, 439-510 ; hind foot, 72-80 ; ear, 39-46.

Skull (Text-fig. 2) *measurements* : See Table 1.

Distribution : Known from the hills of Nepal, Sikkim and West Bengal (Darjeeling District).

Remarks : In one male (from Selimbong), one female (unknown locality), 2 unsexed and 1 juv. (1 ad. and 1 juv. from Sikkim and the other from unknown locality) the middorsal stripe and the blob on the forehead are absent, only a Buff-Yellow to Orange-Buff streak is present on the neck. In two females (from Ghoombhanjang) the dorsal stripe is obsolete and the blob on the forehead is ill defined. The middorsal stripe is of the same colour as the shoulder patch. The stripe is generally distinct, but occasionally broken at places, or obsolete, or absent altogether. The colour of the limbs, like that of the parachute, is Orange-Rufous. Sometimes the manus and/or the pes are black.

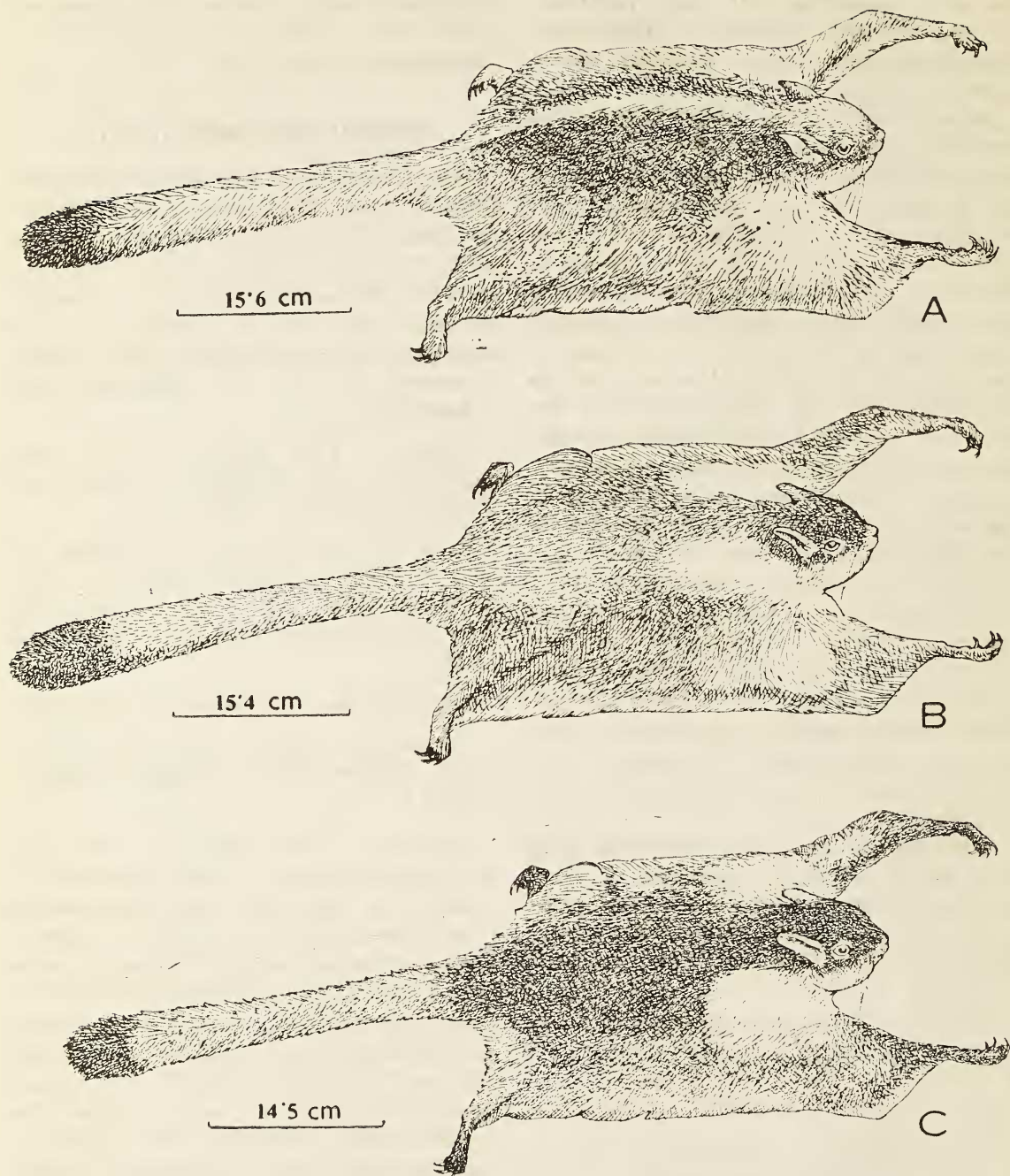


Fig. 1. Colour patterns of three giant flying squirrels in dorsal view: A. *Petaurista nobilis nobilis* (Gray); B. *Petaurista magnificus magnificus* (Hodgson), and C. *Petaurista magnificus hodgsoni* subsp. nov.

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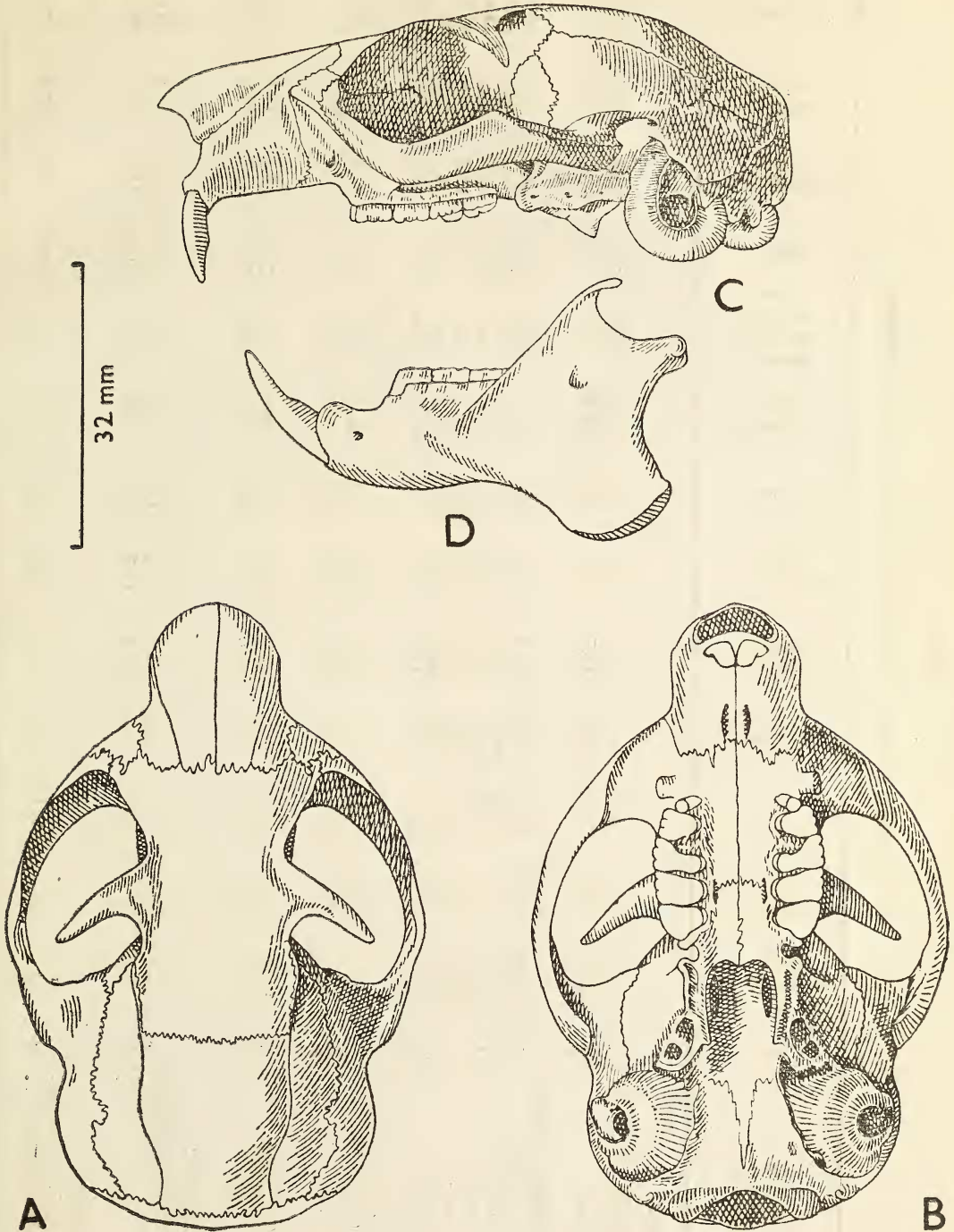


Fig. 2. Skull and lower jaw of *Petaurista nobilis* (Gray): A. dorsal view of skull; B. Ventral view of skull; C. lateral view of skull; D. lower jaw in lateral view.

TABLE 1
CRANIAL MEASUREMENTS OF *Petaurista nobilis*, *P. m. magnificus* AND *P. m. hodgsoni*

Locality & Species	Sex	Occipitonasal length	condylobasal length	Palate	Diastema	Upper toothrow	Inter orbital width	Bulla	Zygomatic width	Cranial width at auditory meatus	Nasal	Post orbital width	Maxillary width	Lower jaw
<i>P. nobilis</i> :														
Selimbong, Darjeeling, West Bengal	♂	72.8	68.8	38.0	16.5	16.0	14.7	12.3	45.0	33.3	22.6	15.8	18.4	44.1
-do-	♀	69.5	64.0	35.8	13.3	15.7	15.5	12.0	44.8	31.4	21.6	17.9	17.8	42.0
<i>P. m. magnificus</i> :														
Ghoombhanjang, Darjeeling, West Bengal	♂	71.7	65.0	35.3	14.9	15.4	18.0	12.1	47.6	34.0	21.6	16.5	17.8	44.5
-do-	♀	70.2	66.2	36.0	14.1	16.8	17.3	11.8	45.6	34.5	22.3	17.0	18.8	43.3
-do-	♂	69.8	66.0	35.9	15.0	16.1	16.0	11.8	47.8	34.4	21.7	16.8	18.2	44.6
-do-	♀	68.5	64.5	35.2	14.7	16.0	14.6	12.0	43.0	33.5	22.4	15.5	18.0	43.7
-do-	♂	72.2	65.6	35.0	15.0	16.0	15.0	13.1	47.5	34.1	22.0	18.2	18.9	44.7
-do-	♀	67.9	63.6	34.5	14.0	15.0	15.3	12.6	44.5	32.6	20.5	17.6	17.9	43.0
<i>P. m. hodgsoni</i> :														
Selimbong, Darjeeling, West Bengal	♀	74.0	69.4	37.4	16.3	16.6	16.3	12.3	48.0	35.5	22.3	17.8	19.4	44.8
-do-	♀	72.8	68.5	37.2	14.8	16.0	14.5	13.0	46.0	34.0	21.6	17.7	18.7	43.5
<i>P. m. magnificus</i> :														
Ghoombhanjang, Darjeeling, West Bengal	♀	74.5	68.9	37.7	15.7	16.4	15.8	12.2	49.0	35.0	23.5	17.4	19.5	45.3
-do-	♀	71.1	64.0	36.0	15.2	15.6	15.0	12.6	46.6	33.2	22.3	16.9	18.0	44.4
<i>P. m. magnificus</i> :														
Sathat Hills, Gorkha, Nepal	♂	69.8	63.6	35.8	14.0	15.8	14.4	12.3	47.0	32.6	20.2	16.2	17.5	43.0
-do-	♀	68.4	62.6	34.0	13.9	14.9	14.7	12.2	44.5	31.6	20.8	16.8	17.0	41.1
<i>P. m. hodgsoni</i> :														
Ghoombhanjang, Darjeeling, West Bengal	♂	65.0	60.8	34.1	13.5	15.0	14.8	11.2	43.8	32.3	19.5	17.4	17.0	42.1

Three pairs of mammae (1 thoracic and 2 abdominal). One female collected in June 1974 was lactating. In two other females taken on 15 June 1974 and 26 February 1975, single embryos were found in the right horn of the uterus of both of them.

***Petaurista nobilis singhei* Saha**

Petaurista nobilis singhei Saha, 1977, *Proc. zool. Soc., Calcutta*, 28 (1975) : 27-29. Bhutan.

Material examined : Bhutan : 1 ♂, 4 ♀ (1 ♀ bearing ZSI Reg. No. 19643 is holotype) : Gomchu (alt. c 2286 m), Gomchu Valley, 28 Mar. 1966 and 25 to 27 Dec. 1973 ; 1 ♂, 1 ♀ : Paro (alt. c 2440 m), Paro Valley, 14 Feb. 1969 ; 1 ♀ : Mithangarh (alt. c 1676 m), Diya Valley, 7 May 1966 ; all collected by B. Biswas and are the material of the type-series.

Diagnosis : Larger in size. Deeper and richer in coloration than the nominate subspecies. Pelage thicker, woolly and glossy. Saddle rich Maroon. Shoulder patch extends along the side of body and rich Orange-Beff. Parachute Ochraceous-Salmon. Middorsal stripe usually absent, but when present, obsolete or broken at places. Blob on forehead bright Orange-Beff and invariably present.

External measurements : 2 ♂ : Head and body, 414-490 ; tail, 495-510 ; hind foot, 80-81 ; ear, 46-51. 6 ♀ (including the holotype) : Head and body, 414-487 ; tail, 464-590 ; hind foot, 79-85 ; ear, 45-51.

Skull measurements : 1 ♂ : Occipitonasal length, 72.0 ; palate, 37.8 ; toothrow, 17.9 ; nasal, 20.4 ; frontal length, 30.1 ; orbit, 18.6, bulla, 13.1. 6 ♀ (including holotype type) : Occipitonasal length, 75.5-79.8 ; palate, 38.5-42.7 ; toothrow, 17.3-18.5 ; nasal, 21.7-24.3 ; frontal length, 29.0-31.7 ; orbit, 18.8-20.1 ; bulla, 12.7-13.2.

Distribution : So far known it is widespread in Bhutan.

***Petaurista magnificus* (Hodgson)**

Sciuropterus magnificus Hodgson, 1836, *J. Asiat. Soc. Beng.*, 5 : 231. Nepal.

For diagnosis see key (p. 101).

***Petaurista magnificus magnificus* (Hodgson)**

Material examined : Nepal : 1 ♂, 1 ♀ : Sathen Hills, Gorkha, 14 and 15 Jan. 1923, coll. N. A. Baptista.

Diagnosis : Upper surface with shades of reddish chestnut and whitish grizzling. Shoulder patch confined to pectorals, Saturn Red with golden hue (Text-fig. 1B). Under-surface Orange-Beff to Chestnut Orange.

External measurements : 1 ♂ : Head and body, 370 ; tail, 470 ; hind foot, 74 ; ear, 43. 1 ♀ : Head and body, 385 ; tail, 480 ; hind foot, 76 ; ear, 42.

Skull measurements : See Table 1.

Distribution : Hills of Nepal. Replaced by the following subspecies in Darjeeling District of West Bengal in the east. Its alleged occurrence in Assam, particularly to the south of the Brahmaputra, is obviously due to confusion with *P. albiventer*.

***Petaurista magnificus hodgsoni* subsp. nov.**

Material : Holotype : 1 ♂ (ZSI. Reg. No. 20110) ; Ghoombhanjang (alt. c 2117 m), Darjeeling District, West Bengal, India ; 30 Mar. 1975 ; coll. R. K. Ghose. Deposited in the National Zoological Collection, Zoological Survey of India, Calcutta.

External measurements (holotype) : Head and body, 359 ; tail, 415 ; hind foot, 72 ; ear, 41.5.

Skull (Text-fig. 3) *measurements* (holotype) : Occipitonasal 65, condylobasal 60.8, palate 34.1, diastema 13.5, nasal 19.5, bullae 11.2, toothrow 15.

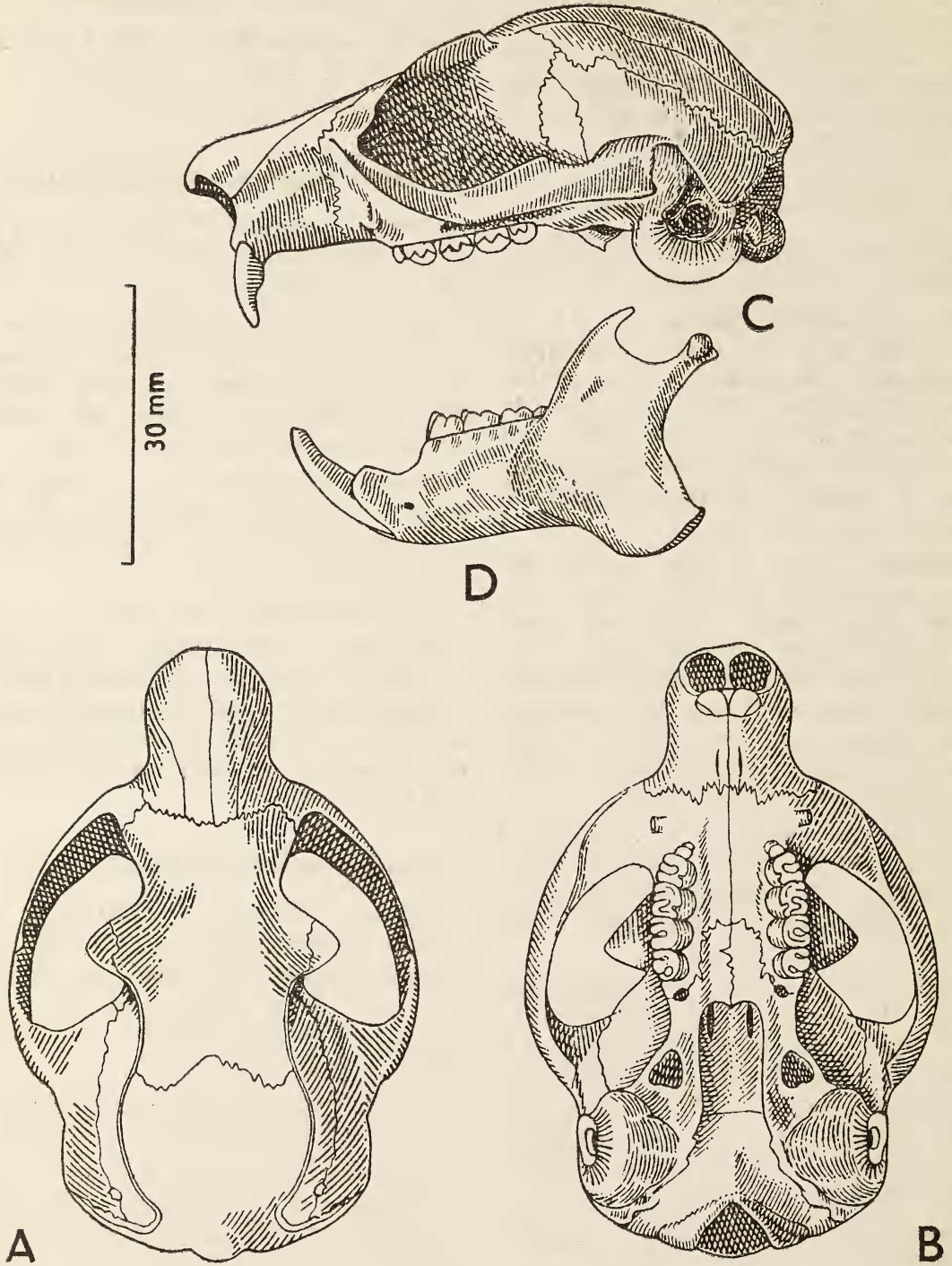


Fig. 3. Skull and lower jaw of *Petaurista magnificus hodgsoni* subsp. nov. : A. dorsal view of skull ; B. ventral view of skull ; C. lateral view of skull ; D. lower jaw in lateral view.

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Description : Upper surface chestnut mixed with some black hairs. Shoulder patch Cream- Buff to Colonial Buff. Limbs and parachute lighter than back and coloured Burnt Sienna. Tail Capuchin Orange to Xanthine Orange with a black tip (Text-fig. 1C), Undersurface Apricot Buff.

Distribution : So far known only from the type locality.

Remarks : *Petaurista m. hodgsoni* is smaller in size than *P. m. magnificus*. Although it is smaller in other cranial measurements, the interorbital bridge is wider than that of the

nominate subspecies, and the skull is more rounded in overall aspect. Larger proportions of ear to head and body 12.5% (against 9.9-11.6%), and condylobasal 93.5% (against 91.1-91.3%), cranial width 49.3% (against 46.1-46.6%), postorbital width 28% (against 23.2-24.8%), and maxillary width 26.6% (against 24.8-25%) to occipitonasal length (Table 1) together with the strikingly different coat colour in *P. m. hodgsoni* warrants its separation from the nominate subspecies.

The new subspecies is named after the late Mr. B. H. Hodgson who is aptly known as the father of Indian vertebrate zoology.

KEY TO THE IDENTIFICATION OF THE SPECIES AND SUBSPECIES OF *P. magnificus* AND *P. nobilis*

- | | |
|--|--------------------------|
| 1. Shoulder patch confined to pectorals. Rest of upper surface more or less uniformly coloured | <i>P. magnificus</i> (2) |
| Shoulder patch extends beyond pectorals along sides of body, isolating a distinct saddle | <i>P. nobilis</i> (3) |
| 2. Colour in general bright. Upper surface reddish chestnut, grizzled with whitish. Shoulder patch bright golden yellow. Under surface ochraceous | <i>P. m. magnificus</i> |
| Colour in general darker. Upper surface chestnut. Shoulder patch Cream- Buff. Under surface Apricot Buff | <i>P. m. hodgsoni</i> |
| 3. Saddle maroon. Usually a middorsal stripe present. Under surface Salmon- Buff to Flesh-Ochre. Parachute Orange-Rufous. Shoulder patch and sides of body Buff-Yellow to Orange- Buff | <i>P. n. nobilis</i> |
| Saddle rich glossy maroon. Middle stripe usually absent. Under surface Ochraceous-Salmon. Parachute deep Orange-Rufous. Shoulder patch including sides of body rich Orange- Buff. | <i>P. n. singhei</i> |

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